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Claims

1. An improvised membrane-based device for speedier and effective concentrating of aqueous solution upto about 95%, as shown in figure nos. 1-4, wherein the device comprises:

Part No.	Description of the parts of the device
1	herbal extract solution container
2	permeate solution container
3	filter to remove suspended particle from feed extract
4	Panel for control of different operations
5	main power supply switch
6	diaphragm type pressure pump through which the extract solution enters into the filter vessel (3)
7	membrane module through which the permeate is separated and the concentrate is recycled to the extract container (1)
8-13	Six solenoid valves which control the direction of the flow during the concentrate, drain and wash modes, respectively.
14	Back pressure regulator
15	fabric filter through which clear solution enters into the membrane module (7)
16	air bleeding valve which can be opened to remove any trapped air in the system
17	plastic body housing the membrane
18	thin film composite spiral membrane element for removal of water from extract under pressure
19	inlet for introducing the clear herbal extract solution
20	Concentrate outlet for recycling the extract to the extract container (1)
21	permeate outlet for sending the water to the permeate container (2)
22	Rubber 'O' ring
23	By-pass seal for allowing the extract solution to pass through the membrane

2. A device as claimed in claim 1, wherein the device is particularly effective in concentrating herbal extracts.
3. A device as claimed in claim 1, wherein the device can be scaled up without any change in basic design and operating parameters.
4. A device as claimed in claim 1, wherein the device maintains stability of the solution by functioning at room temperature, preferably about 25°C.

5. A device as claimed in claim 1, wherein the device concentrates the aqueous solution without frothing.
6. A device as claimed in claim 1, wherein the concentrate retains all constituents of the solution.
- 5 7. A device as claimed in claim 1, wherein the vertical container works as a reservoir for continuous supply of feed.
8. A device as claimed in claim 1, wherein the permeate container with outlet valve continuously removes water.
9. A device as claimed in claim 1, wherein the filter vessel coupled with air
10 bleeding valve enables removal of suspended particles and trapped air, respectively, thus, allows only clear solution to flow into the membrane module.
10. A device as claimed in claim 1, wherein the membrane module containing spiral thin film composite membrane allows water to pass while retaining other components, and the solution to circulate in the system.
- 15 11. A device as claimed in claim 1, wherein the solenoid valves helps changing the path of aqueous solution/ water during the drain/ wash mode for operation.
12. A device as claimed in claim 1, wherein the pressure pump enables adequate pressure to be attained for continuous flow of aqueous solution.
13. A device as claimed in claim 1, wherein the control panel coupled with ON and
20 OFF switch helps concentrating the aqueous solution, and continuously washing the membrane for optimum life.
14. A device as claimed in claim 1, wherein the membrane module has length and diameter in the ratio of about 6:1.
15. A device as claimed in claim 1, wherein the membrane has overall thickness
25 ranging between 130 to 170 microns.
16. A device as claimed in claim 1, wherein the aqueous solution container has length and diameter in the ratio of about 4:1.
17. A device as claimed in claim 1, wherein the permeate container has length and diameter in the ratio of about 4:1.
- 30 18. A device as claimed in claim 1, wherein the solenoid valves controls the direction of the flow in modes selected from a group comprising concentrate mode, drain mode, and wash mode.

19. A method of manufacturing an improved membrane-based device for speedier and effective concentrating of aqueous solution upto 95%, wherein the said device is manufactured by assembling in a manner as shown in figure nos. 1-4.

Part No.	Description of the part
Figure 1	
1	herbal extract solution container
2	permeate solution container
3	filter to remove suspended particle from feed extract
4	Panel for control of different operations
5	main power supply switch
Figure 2	
6	diaphragm type pressure pump through which the extract solution enters into the filter vessel (3)
7	membrane module through which the permeate is separated and the concentrate is recycled to the extract container (1)
8-13	Six solenoid valves which control the direction of the flow during the concentrate, drain and wash modes, respectively.
14	Back pressure regulator
Figure 3	
15	fabric filter through which clear solution enters into the membrane module (7)
16	air bleeding valve which can be opened to remove any trapped air in the system
Figure 4	
17	plastic body housing the membrane
18	thin film composite spiral membrane element for removal of water from extract under pressure

19	inlet for introducing the clear herbal extract solution
20	concentrate outlet for recycling the extract to the extract container (1)
21	permeate outlet for sending the water to the permeate container (2)
22	Rubber 'O' ring
23	By-pass seal for allowing the extract solution to pass through the membrane

20. A method as claimed in claim 19, wherein the device comprises:

Part No.	Description of the parts of the device
1	herbal extract solution container
2	permeate solution container
3	Filter to remove suspended particle from feed extract
4	Panel for control of different operations
5	Main power supply switch
6	diaphragm type pressure pump through which the extract solution enters into the filter vessel (3)
7	membrane module through which the permeate is separated and the concentrate is recycled to the extract container (1)
8-13	Six solenoid valves which control the direction of the flow during the concentrate, drain and wash modes, respectively.
14	Back pressure regulator
15	Fabric filter through which clear solution enters into the membrane module (7)
16	air bleeding valve which can be opened to remove any trapped air in the system
17	plastic body housing the membrane
18	thin film composite spiral membrane element for removal of water from extract under pressure
19	inlet for introducing the clear herbal extract solution
20	concentrate outlet for recycling the extract to the extract container (1)
21	permeate outlet for sending the water to the permeate container

	(2)
22	Rubber 'O' ring
23	By-pass seal for allowing the extract solution to pass through the membrane

21. An improved process of speedier and effective concentrating of the aqueous solution upto about 95% using a membrane-based device of figure nos. 1-4, said process comprising steps of:

- a. feeding the aqueous solution into the aqueous solution container (1),
- b. filtering (3) the fed solution to remove suspended particles.
- c. passing the resultant filtered solution into a membrane module (7),
- d. segregating permeate and concentrate in the membrane module, and
- e. recycling the concentrate multiple times to obtain the highly concentrated final concentrate.

22. A process as claimed in claim 21, wherein the device comprises:

Part No.	Description of the parts of the device
1	herbal extract solution container
2	permeate solution container
3	Filter to remove suspended particle from feed extract
4	Panel for control of different operations
5	Main power supply switch
6	diaphragm type pressure pump through which the extract solution enters into the filter vessel (3)
7	membrane module through which the permeate is separated and the concentrate is recycled to the extract container (1)
8-13	Six solenoid valves which control the direction of the flow during the concentrate, drain and wash modes, respectively.
14	Back pressure regulator
15	Fabric filter through which clear solution enters into the membrane module (7)
16	air bleeding valve which can be opened to remove any trapped air in the system
17	plastic body housing the membrane
18	thin film composite spiral membrane element for removal of water from extract under pressure
19	inlet for introducing the clear herbal extract solution
20	concentrate outlet for recycling the extract to the extract container (1)

21	permeate outlet for sending the water to the permeate container (2)
22	Rubber 'O' ring
23	By-pass seal for allowing the extract solution to pass through the membrane

23. A process as claimed in claim 21, wherein the process is particularly effective in concentrating herbal extracts.
24. A process as claimed in claim 21, wherein the device can be scaled up without any change in basic design and operating parameters.
- 5 25. A process as claimed in claim 21, wherein the process is conducted at room temperature, preferably about 25°C.
26. A process as claimed in claim 21, wherein the concentrate of the aqueous solution is without frothing.
27. A process as claimed in claim 21, wherein the concentrate retains all constituents of the solution.
- 10 28. A process as claimed in claim 21, wherein the vertical container works as a reservoir for continuous supply of feed.
29. A process as claimed in claim 21, wherein the permeate container with outlet valve continuously removes water.
- 15 30. A process as claimed in claim 21, wherein the filter vessel coupled with air bleeding valve enables removal of suspended particles and trapped air respectively, thus, allows only clear solution to flow into the membrane module.
31. A process as claimed in claim 21, wherein the membrane module containing spiral thin film composite membrane allows water to pass while retaining other components, and the solution to circulate in the system.
- 20 32. A process as claimed in claim 21, wherein the solenoid valves helps changing the path of aqueous solution/ water during the drain/ wash mode for operation.
33. A process as claimed in claim 21, wherein the pressure pump enables adequate pressure to be attained for continuous flow of aqueous solution.
- 25 34. A process as claimed in claim 21, wherein the control panel coupled with ON and OFF switch helps concentrating the aqueous solution, and continuously washing the membrane for optimum life.
35. A process as claimed in claim 21, wherein the membrane module has length and diameter in the ratio of about 6:1.

36. A process as claimed in claim 21, wherein the membrane has overall thickness ranging between 130 to 170 microns.
37. A process as claimed in claim 21, wherein the aqueous solution container has length and diameter in the ratio of about 4:1.
- 5 38. A process as claimed in claim 21, wherein the permeate container has length and diameter in the ratio of about 4:1.
39. A process as claimed in claim 21, wherein the solenoid valves controls the direction of the flow in modes selected from a group comprising concentrate mode, drain mode, and wash mode.
- 10 40. A process as claimed in claim 21, wherein the process helps eliminate the hold-up volume.
41. A process as claimed in claim 21, wherein the process minimizes the membrane fouling.
42. A process as claimed in claim 21, wherein the process prevents contamination
15 of the solution.